

## **V. COMMUNITY ENVIRONMENTAL CONCERNS**

### **A. Hazardous Waste Sites**

Information regarding hazardous waste sites located in the town of Wayland and listed by the Massachusetts Department of Environmental Protection (MDEP) was obtained and reviewed. The MDEP is the state agency responsible for the monitoring, assessment and clean up of releases of oil and hazardous materials at disposal sites in Massachusetts. These sites are regulated under Massachusetts General Laws, Chapter 21E.

A total of 17 sites located in Wayland were identified by the MDEP as Confirmed disposal sites or Locations to be Investigated (LTBI) during the years 1987-1993 (MDEP 1995a). Of these sites, four (including the Dow Chemical site) are listed as Confirmed, nine are listed as LTBI and four sites have Waiver status. (Confirmed status is a location confirmed by the MDEP to be a disposal site, and for which remedial response actions have not been completed. Waiver status are locations confirmed by the MDEP to be non-priority disposal sites, and where an interested party has been authorized to proceed with response actions without MDEP oversight. LTBI are locations the MDEP considers reasonably likely to be disposal sites but are as yet unconfirmed.) There was no unusual pattern or concentration of cancer types in Wayland in relation to Confirmed disposal sites or LTBI listed by the MDEP. Refer to Figure 7 for the location of MDEP 21E sites.

### **B. Former Dow Chemical Company Site**

Numerous environmental investigations have taken place at the Dow site. The following section is a review of environmental information and data for the Dow site based on the following reports:

- *Final Preliminary Assessment Report, Dow Chemical Corporation (former), Wayland, MA*, prepared by the CDM Federal Programs Corporation for the U.S. Environmental Protection Agency (CDM 1995).

- *Phase II Comprehensive Site Assessment, Former Dow Chemical Facility, Wayland, MA*, prepared by Ransom Environmental Consultants in March 1999 (Ransom 1999a).
- *Phase II Comprehensive Site Assessment, Addendum and Errata Sheet, Former Dow Chemical Facility, Wayland, MA*, prepared by Ransom Environmental Consultants in September 1999 and in January 2000 (Ransom 2000a).
- *Method 3 Risk Characterization, Former Dow Chemical Facility, Wayland, MA*, prepared by Gradient Corporation in January 2000 (Gradient 2000).
- *Completion Report, Release Abatement Measure No. 3, Former Dow Chemical Facility, Wayland, MA*, prepared by Ransom Environmental Consultants in March 2000 (Ransom 2000b).
- *Results of Sampling Activities, Voluntary Response Action, Former Dow Chemical Facility, Wayland, MA*, prepared by Ransom Environmental Consultants in March 2000 (Ransom 2000c).
- *Facility Closure Report, Former Dow Chemical Facility, Wayland, MA*, prepared by Ransom Environmental Consultants in April 2000 (Ransom 2000d).

# 1. Site Description

The former Dow Chemical Company site covers approximately 16 acres and consisted of a former small scale research facility located in the western portion of a 35.71 acre property located at 412 Commonwealth Road (Route 30) in Wayland, MA (Ransom 2000a). Dow operated a chemical research facility known as the Wayland Eastern Research Laboratory at the site between 1964 and 1988. Operations at the facility consisted of chemical research activities (e.g., synthesis of agricultural and pharmaceutical compounds) (CDM 1995, Greene 1997). Currently, the site is unoccupied and consists of vacant land (Gradient 2000).

The eastern portion of the property is undeveloped. The site is abutted to the south by undeveloped wetlands and wooded areas on the Willow Brook Farm condominium complex property, and to the west by undeveloped land and protected open space on Rice Road (Gradient 2000). Walking trails wind through the wooded portion of the property.

The western portion of the site was developed for commercial use. Several buildings were formerly located at the site including a main office, a laboratory building, a cooling tower building, a solvent

storage shed, a garage, and a small shed. All buildings were demolished between January and March 2000 (Ransom 2000b). No buildings are currently at the site. Refer to Figure 5 for locations of the former buildings.

Three ponds, referred to as the North, West, and East Ponds, are also located on the site. The North Pond is located northeast of the former laboratory building and drains south to the two smaller ponds. East Pond and West Pond are located in the southernmost and lowest portion of the site along Commonwealth Road. Two underground storage tanks (USTs) for heating oil were also present on the property. These USTs were removed in November 1996 (Ransom 1997a). In addition, two septic systems formerly existed on the property; one served the main floor of the laboratory building and the second served the basement floor of the laboratory building.

Based on employee reports and environmental investigations, several areas of possible contamination were identified on the site. These areas include the former shallow disposal area, the former burn bucket area and concrete pad area, the upper septic system area, and the former UST and lower septic system area (Refer to Figure 5). During the 1970s and 1980s, Dow dredged the North Pond and West Pond for aesthetic reasons and to prevent the ponds from drying up during the summer months (Ransom 1999a). These piles of dredged pond sediments were located near the former burn bucket area and the former concrete pad. In the past, the site was not fenced and local residents frequently walked on the property in both developed and undeveloped areas (CDM 1995).

Groundwater under the site flows in a south-southeasterly direction and can be found on average at 11 feet below the ground surface (Gradient 2000). Land use surrounding the site is residential. The nearest residence is located approximately 500 feet west of the property on Rice Road. An estimated 4,321 residents live within a one-mile radius of the property. Three municipal wells in the bordering town of Natick are located over one mile south of the site (Ransom 1999a). There are no public or private water supply wells located within a one mile radius of the site (Gradient 2000).

## 2. Site History

Dow purchased the property in 1963 and owned it until 1988. Before its use as a chemical facility, the property was part of a farm. In 1989, New England Development (NED) purchased the property from Dow with intentions of building office buildings on the site. However, after the discovery of environmental contamination, the property was resold to Dow in February 1995.

As previously mentioned, Dow's operations at the site primarily consisted of research. The types of wastes handled by Dow included chlorinated solvents, acids, metals, alcohols, other organic compounds, and possibly herbicides. According to the *Phase II Comprehensive Site Assessment*, Dow disposed of solvents and wastes in several areas of the site (Ransom 1999a). Incineration of flammable solvents and fire training occurred in the former burn bucket area located in the northeastern area of the site. Dow also disposed of empty and broken solvent bottles (stored primarily in tubes and ampules) in the former shallow disposal area located south of and adjacent to the former garage. This activity reportedly took place between 1964 and 1970. Within this area, small quantities of sodium, lithium, and other compounds such as copper sulfate were buried and covered with dirt (Ransom 1999a). A sump located near the former laboratory building collected cooling water, which was used to clean laboratory instruments. This sump drained into North Pond. Reportedly, solvents used to clean laboratory glassware were routinely washed down the drains into the upper septic system at the site (Ransom 1999a).

In February 1994, the Dow site was designated by the MDEP as a Tier 1A site under the state Superfund program. The site received this designation due to concern over the potential existence of chemicals on the site which are not detected by standard analyses and due to the lack of information on past chemical usage at the site (MDEP 1998b). This designation required the MDEP to oversee all cleanup or response actions at the site. In February 1999, the MDEP reclassified the Dow site as a Tier 1C site (MDEP 1999a). Under this designation, the MDEP no longer provided direct oversight of investigations or other activities that occurred at the site. Site investigations were completed in June 2000 (Ransom 2000). The town of Wayland plans to purchase the Dow property for use as conservation land. According to the *Method 3 Risk Characterization*, a deed restriction will be placed on the property as a condition of the sale in order to prevent use of the property for residential housing (Gradient 2000, Ransom 1999d).

### 3. Site Remedial Activities

Numerous environmental investigations and remedial activities have occurred at the Dow site. In October 1994, Dow began implementing a Release Abatement Measure (RAM) plan for the site. The RAM activities included sampling areas of suspected contamination on the site and the removal of contaminated soil and debris. RAM activities also included the removal of two underground storage tanks (USTs), the installation of soil borings and monitoring wells and the analysis of soil and groundwater samples (MDEP 1998a).

Specifically, the major activities that occurred as part of the RAM included the following:

- Seventeen soil samples were collected from the area of the upper septic system and analyzed for the presence of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, inorganic compounds, pesticides, and herbicides. Soil samples were collected at depths ranging from four to eight feet. In addition to sampling in the upper septic system area, soil samples from depths of two to four feet were collected for analysis from what is referred to as the stone disposal area west of the upper leaching field. Two-to-four foot samples were also collected in a subset of the boring locations associated with the upper septic system.
- Test pit excavation and soil sampling in the former burn bucket area. Four shallow test pits were excavated in two burn areas (referred to as Burn Bucket Area 1 and 2). The pits were excavated to a depth of three feet or greater if possible. Four composite soil samples from each area were collected and analyzed for VOCs, SVOCs, and metals.
- Removal of the concrete pad in the former fire training area, soil removal, and residual soil sampling. Soil was excavated to a depth of two feet in the area of and surrounding the removed

concrete pad (a slab four inches thick). Six soil samples were collected in an area in and around the pad and analyzed for VOCs, SVOCs, and metals.

- Test pit excavations and soil sampling in the former shallow disposal area. Four soil samples were collected for chemical analysis from two test pit areas and analyzed for VOCs, SVOCs, metals, and inorganic compounds. Test pits were excavated to a depth of four feet east of the former cooling tower building. Soil and debris consisting of broken and intact vials, small bottles, and other laboratory glassware were unearthed (Ransom 1999a). Vials and other glassware as well as excavated soil were placed in drums for disposal.

A second RAM plan for the site was implemented in November 1996. At that time, two USTs were removed and additional soil sampling in the former shallow disposal area and former burn bucket area was conducted (Ransom 1997a). None of the samples collected detected contaminants at concentrations that were greater than the previous sampling rounds (Greene 1997a).

As part of the remedial activities at the site, the Dow Chemical Company retained Gradient Corporation to develop soil clean-up guidelines for compounds that were identified in on-site soil during the second RAM. These compounds include organotin and organomercury compounds -- compounds that were present at the Dow site (based on company records) and for which no clean-up guidelines exist (Greene 1997b). Gradient Corporation developed soil clean-up guidelines for these compounds, which were approved for use by the MDEP (Gradient 1995 and 1996; MDEP 1996, Ransom 1999a).

Ransom Environmental Consultants, Inc. conducted a *Phase II Comprehensive Site Assessment* for the former Dow Chemical facility in the fall of 1998. As part of the *Phase II Comprehensive Site Assessment*, surface water and sediment samples were collected from the North Pond, East Pond, and West Pond. In addition, sediment samples were collected from the dredged sediment piles (containing sediments from the North Pond and the West Pond), and seven new groundwater monitoring wells were installed and sampled at the site.

#### 4. Summary of Environmental Sampling

It should be noted that this report is not a comprehensive review of all environmental investigations that have taken place at the Dow site. Over the past thirteen years, various environmental samples have been collected and analyzed at the Dow site. These samples have been taken to monitor septic systems, to evaluate residual contamination associated with the USTs, and to determine the nature and extent of contamination associated with historical waste disposal practices at the facility. The MDPH has reviewed and analyzed all available environmental sampling data for the Dow site. Due to the large volume of environmental sampling data that exists for the former Dow site, the following discussion is a limited summary of the sampling that has occurred at the site. The focus of this review is to identify potential chemicals of concern detected in environmental media at the site to which people may have

been or could be exposed. A complete presentation of the results of environmental sampling at the site is provided in the *Phase II Comprehensive Site Assessment* (Ransom 1999a).

To provide a screening-level evaluation of the possible health significance of chemicals detected on the Dow site, the maximum detected concentration of a chemical detected in any location on the site was compared to the Agency for Toxic Substances and Disease Registry (ATSDR) comparison values (ATSDR 2000). The ATSDR comparison values are media- and chemical-specific concentrations that are used by health assessors to select environmental contaminants for further evaluation. Comparison values are screening-level guidelines, that is, media concentrations less than a comparison value are unlikely to pose a health threat. However, because comparison values were developed as media-specific guidelines, the health risks resulting from concurrent exposures to chemicals in more than one medium need to be considered. Also, media concentrations above a comparison value do not necessarily represent a health threat; for a health threat to be present, an individual must actually be exposed or come into contact with the chemical.

a. Surface Soil

As part of an *Environmental Assessment* conducted at the Dow site in 1988 by Anderson-Nichols & Company, Inc. (as discussed in the *Final Preliminary Assessment*), four surface soil samples were

collected from the former shallow disposal area and the former burn bucket area located on the eastern portion of the property. The ATSDR, however, defines surface soil as 0 to 3 inches below the ground surface and no samples of this depth were collected at the Dow site. The four surface soil samples collected in 1988 were taken at a depth of 0 to 2 feet. The samples were analyzed for VOCs and SVOCs.

In three of the four samples, one SVOC (bis(2-ethylhexyl)phthalate) was detected at a maximum concentration of 1.6 mg/kg (i.e., parts per million [ppm]). This concentration was detected in the former shallow disposal area and is well below the ATSDR comparison value of 50 mg/kg (a cancer risk evaluation guide). It should be noted that the presence of bis(2-ethylhexyl)phthalate in low concentrations in environmental samples is often attributed to laboratory contamination. Several polycyclic aromatic hydrocarbons (PAHs) were also detected in one of the four samples collected in the burn bucket area. These PAHs were detected at concentrations ranging from 0.49 mg/kg phenanthrene to 1.2 mg/kg pyrene. The detected concentrations are above reported PAH background levels for rural areas but well within the range of expected concentrations for urban areas (ATSDR 1995). In addition, PAHs are products of combustion and would be expected to be found at concentrations above background in an area where burning took place.

Since the Anderson-Nichols & Company, Inc. *Environmental Assessment* was conducted in 1988, soil in the burn pit area has been excavated as part of the 1996 RAM activities. Therefore, the concentrations of PAHs detected in 1988 most likely do not reflect current soil conditions at the site.

Other RAM activities included additional soil sampling conducted in the upper leachfield, in a stone disposal area located west of the upper leachfield, the former burn bucket area, and the former shallow disposal area. The soil was analyzed for VOCs, SVOCs, and total metals. Some of the soil samples analyzed as part of the RAM were collected at depths of two feet or less. Shallow samples (0-2 feet) were collected west of the upper leachfield (B109-S1 and B110-S1), in the concrete pad area (EB1-S1, EB2-S1, CPOE-S1, and CPOE-S2), and in the burn bucket area (BBA1-S1 and BBA2-S1). Some chemicals detected at the above sampling locations were not on the USEPA Target Compound List (TCL) for Superfund sites (CDM 1995). The TCL contains 129 compounds that are considered as potentially hazardous and analyzed at Superfund sites. During any site investigation it is not unusual



that some non-TCL compounds are detected but not identified or tentatively identified during laboratory analysis. The unidentified compounds found at the Dow site were detected at very low concentrations (i.e., less than 0.05 mg/kg). Further investigations revealed that some of these compounds had origins as plant derived organic matter, and were therefore thought to be products of decomposition.

Of those compounds that were identified, PAHs were the most commonly detected. The maximum detected concentrations of PAHs in the 0 to 2 feet depth samples were found at CPOE-S2 in the concrete pad area and ranged from 1.1 ppm 2-phenylnaphthalene to 9.8 ppm fluoranthene. Chrysene and benzo(a)pyrene were above rural/urban background concentrations and

benzo(a)pyrene exceeded the comparison value (0.1 mg/kg). In one sample (CPOE-S2), xylenes were detected at a concentration well below the ATSDR comparison values for this chemical. For those metals for which comparison values or background data exist, the metals detected in the surface soil were either below or approximately equal to comparison values or within the range of reported background levels.

Additional soil sampling in the former shallow disposal area and the former burn bucket area was conducted as part of the second RAM. Again, no contaminants were detected at concentrations greater than what was discovered during the initial RAM (Greene 1997a).

b. Subsurface Soil

As part of the *Environmental Assessment* conducted in 1988, subsurface soil samples were collected in the upper and lower leachfields. For purposes of this report, subsurface soil samples are considered as those collected at a depth greater than two feet. The samples were analyzed for VOCs and SVOCs.

The only compound detected in the three samples was bis(2-ethylhexyl)phthalate ranging from 0.43 to 0.73 mg/kg. These concentrations are well below the soil comparison value for this chemical.

As part of the *Addendum to Phase I Investigation* prepared in May 1993 by Environmental Science Services (ESS) (and summarized in the *Final Preliminary Assessment Report*), subsurface soil

samples ranging in depth from 5 to 12 feet were collected from the upper and lower leachfield. These samples were analyzed for the presence of VOCs, SVOCs, metals, and dioxins. The compounds detected included PAHs, metals, and bis(2-ethylhexyl)phthalate. Please refer to table 6 of the *Final Preliminary Assessment Report* for a complete presentation of the analytical data. Of the metals detected in the subsurface soil, the maximum detected concentrations were either below or approximately equal to the soil comparison values. PAHs were detected in one sample at a five-foot depth. The detected concentrations of PAHs were typical of urban soil (in the low parts-per-million range) but above background rural concentrations. For those PAHs with soil comparison values, only one compound (benzo(a)pyrene) was detected at a concentration (1.85 mg/kg) above

its comparison value (0.1 mg/kg) but similar to reported background concentrations. The detected concentration of bis(2-ethylhexyl)phthalate was well below its soil comparison value.

As part of the 1994 RAM activities, additional subsurface soil sampling occurred in the upper leachfield (B101-S3 and -S4, B103-S3 and -S4, B104-S4, B105-S3, and B107-S3), and the former shallow disposal area (TP01-S1 and TP01-S2, TP02-S1 and TP02-S2). The soil was analyzed for VOCs, SVOCs, and total metals. The complete analytical results are presented in Tables 8 and 9 of the *Final Preliminary Assessment Report* and in the *Phase II Comprehensive Site Assessment* (CDM 1995, Ransom 1997).

Of the detected metals for which an ATSDR comparison value exists, the highest detected concentrations of arsenic and antimony were above their respective comparison values and reported background levels. The highest detected concentration of arsenic in subsurface soil (at a two to four feet depth in the shallow disposal area) was 48 mg/kg, compared to its comparison value of 0.5 mg/kg and reported background levels of 1 to 40 mg/kg (ATSDR 1993). The highest detected concentration of antimony (28 mg/kg) is above its comparison value (20 mg/kg). Although no comparison value exists for mercury, mercury was detected in the shallow disposal area at 62 mg/kg, above background levels (MDEP 1998c). Other metals detected in the soil were either below or approximately equal to comparison values or below reported background levels.

Again, some of the chemicals detected at these sampling locations were not on the USEPA TCL for Superfund sites. The TCL includes the most commonly found and known toxic compounds detected at hazardous waste sites. It is not unusual when conducting site sampling to detect non-TCL compounds. The presence of non-TCL compounds does not necessarily indicate that these compounds are contaminants of concern. It should be noted that several of these unknown compounds were found to have origins of decaying plant matter (i.e., terpene and wax compounds). The remaining unknown compounds were partially identified and separated into classes of compounds (e.g., polycyclic aromatic hydrocarbons) (MDEP 1995b). Again, these compounds were detected at very low concentrations and at a depth greater than three inches below ground surface in a heavily wooded area of the site. Therefore, these compounds were not considered as

contaminants of concern. For those organic compounds that were identified and for which an ATSDR comparison value exists, none were detected at a concentration above a comparison value.

c. Groundwater

Monitoring wells have been installed and groundwater sampling has occurred numerous times at the Dow site over the course of the last thirteen years. A summary of the monitoring well installations and sampling programs is given below:

- As part of the *Preliminary Environmental Site Assessment*, GZA installed five monitoring wells in the leachfield area during November 1988: GZ-1, GZ-2, GZ-3, GZ-7, and GZ-9. Environmental sampling results indicated the presence of trace levels of an unidentified compound in GZ-1, GZ-2, and GZ-3 and a trace amount of toluene in GZ-7.
- As part of the *Addendum to Phase I Investigation*, ESS installed five monitoring wells in the leachfield area and northwest of the East Pond (Refer to Figure) in March 1993: PW-1, PW-2, PW-5, PW-6, and PW-7. Wells PW-1 and PW-7 were sampled in April 1993 and the following compounds were detected: acetone and toluene (in both PW-1 and PW-7), and 2-butanone (in well PW-7). The detected concentration toluene in both wells

exceeded drinking water comparison values. Potential exposures to these contaminants are fully discussed further in section VI.

- In December 1993, the MDEP examined the monitoring wells for free phase petroleum product and screened the wells for VOCs. No VOCs or free product were detected.
- In April 1994, ESS sampled monitoring wells GZ-1, GZ-2 and AN-2 (an older well). According to the *Final Preliminary Assessment Report*, bis(1,1-dimethylethyl)phenol was detected at 5 ppb and an unidentified compound was also detected. No drinking water comparison value exists for bis(1,1-dimethylethyl)phenol.
- As part of the *Phase II Comprehensive Site Assessment*, seven new monitoring wells were installed at the Dow site (MW-101 through MW-107). In addition, groundwater samples were also obtained from existing monitoring wells AN-2, AN-3, AN-4, GZ-1, GZ-2, and GZ-7. VOCs such as benzene, TCE and 1,1,1-TCA were detected in monitoring wells located downgradient from the shallow disposal area. The maximum concentration of each VOC detected was below MDEP groundwater standards (Ransom 1999a).
- Groundwater sampling was conducted as part of the Voluntary Response Actions in the spring of 2000. Samples were obtained from the eastern undeveloped portion of the property, the sump area, and a private property located on Thompson Road, west of the Dow site. Sampling results indicated that no oil and/or hazardous material was detected (Ransom 2000c).

Potential exposures to compounds detected in the groundwater are fully discussed in section VI.

d. Surface Water and Sediment

The ponds on the Dow site have been sampled at different times. In 1981, Dow collected samples from the North and West Ponds. It is not clear from the *Final Preliminary Assessment Report*

whether surface water or sediment samples were collected. The highest concentrations of arsenic, mercury and chlorinated solvents were detected in the North Pond. The maximum concentration of lead (9.0 mg/kg) was detected in the West Pond. In 1992, GZA collected two sediment samples from each of the three ponds on the site. Several PAHs and metals were detected in the sediment samples. Although ATSDR comparison values do not exist for sediment, soil comparison values were used as screening values. This is a conservative evaluation because the health risks from exposure to sediment would be expected to be less than soil due to a lower magnitude of exposure to sediment than soil. For those chemicals detected in the sediment for which soil comparison values exist, the detected concentrations of most chemicals were below or approximately equal to the comparison values. However, the detected concentrations of fluoranthene and pyrene in one of two samples collected from the West Pond exceeded their respective soil comparison values.

Flouranthene was detected at a maximum concentration of 3,200 mg/kg, exceeding the ATSDR comparison value of 2,000 mg/kg. Pyrene was detected at a maximum concentration of 3,400, also exceeding the comparison value of 2,000 mg/kg. Arsenic and mercury were detected in both samples at concentrations either below comparison values or within regional background concentrations. No VOCs, pesticides, PCBs, or dioxins were detected in the sediment samples.

In 1998 four sediment samples were obtained from the dredged piles of pond sediments. These samples were analyzed for metals, VOCs, SVOCs, pesticides, herbicides, dibenzodioxins, dibenzofurans, and inorganic compounds. Results of this analysis indicated the presence of metals, SVOCs, VOCs, as well as dioxin and furan compounds. For those compounds detected for which a comparison value was available, the maximum detected concentration of the majority of the compounds were either below ATSDR comparison values or MDEP cleanup standards.

e. Septic System

The contents of the septic tanks have been sampled and analyzed several times. The results of the analyses are contained in the *Final Preliminary Assessment Report* but are not reported here. The focus of this section is environmental media to which individuals have been or could be exposed; contact by individuals with the septic system contents is highly unlikely.